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(21)Application number : 11-367902 (71)Applicant : YASUI SEIKI:KK

(22)Date of filing : 24.12.1999 (72)Inventor : YASUI YOSHINARI
IWASAKI TAKASHI
YAMADA MINORU

(54) GRAVURE COATING METHOD AND GRAVURE COATER

(57)Abstract:

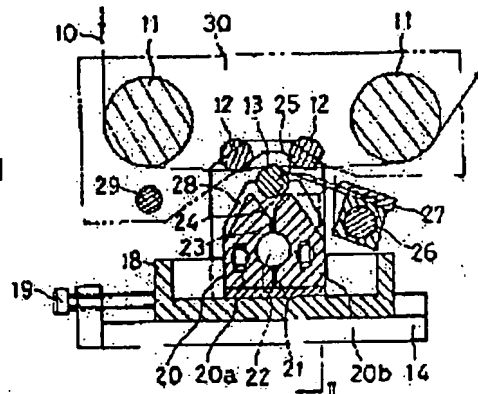
PROBLEM TO BE SOLVED: To provide a

gravure coating method capable of remarkably and precisely applying a coating agent all over to surely obtain uniform thickness on every kinds of thin base materials and the gravure coater.

SOLUTION: A continuous body like base material, the upper surface of which is supported by a pair of freely rotatable parallel attitude control rolls each having about 20-50 mm diameter, and which travels in a direction across the axial direction of both attitude control rolls is arranged in parallel to both attitude control rolls below the continuous body like base material between both attitude control rolls. A

gravure roll having about 20-50 mm diameter has a gravure pattern on the whole outer

peripheral surface. The coating agent is applied all over on the base material by rotating the gravure roll at a peripheral velocity having a relative velocity to the base material, wiping the excess coating agent with a doctor blade from the surface of the gravure roll before the application and applying the fixed quantity of the coating agent on the under surface of the base material at a position, where the upper surface of the base material is in a free state.



LEGAL STATUS

[Date of request for examination]

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CLAIMS

[Claim(s)]

[Claim 1] the continuum it is running in the shaft orientations and the rectangular direction of both the attitude control roll where a top face is supported with the attitude control roll in which parallel free rotation of the pair whose diameter is about 20mm - about 50mm is free -- caudad during said both attitude control roll of the base material of a ** While rotating the gravure roll whose diameter by which it has been arranged at both the attitude control roll and parallel, and the gravure pattern was formed in the perimeter of a peripheral face is about 20mm - about 50mm with the peripheral velocity which has said base material and relative velocity The gravure coating approach which wipes off a surplus coating agent with a doctor blade from the front face of this gravure roll before giving coating, carries out coating of the coating agent of a quantum to the inferior surface of tongue of that base material in the location which has the top face of said base material in a free condition, and is characterized by poor-applying a coating agent to said base material.

[Claim 2] Each attitude control roll is the gravure coating approach according to claim 1 characterized by approaching a gravure roll and being arranged, respectively.

[Claim 3] the continuum it is running -- the diameter which supports the top face of the base material of a ** with the attitude control roll in which parallel free rotation of the pair which is about 20mm - about 50mm is free The top face of the base material of a ** is the gravure roll which carries out coating of the coating agent to the inferior surface of tongue of the base material in the location in a free condition. the continuum it is running between both attitude control rolls -- The gravure roll whose diameter by which it has been arranged at both the attitude control roll and parallel, and the gravure pattern was formed in the perimeter of a peripheral face is about 20mm - about 50mm, The gravure coater characterized by having the doctor blade which a surplus coating agent is wiped [doctor blade] off from the front face of this gravure roll before giving coating, and makes the coating agent of a quantum supply to the coating section.

[Claim 4] Each attitude control roll is a gravure coater according to claim 3 characterized by approaching a gravure roll and being arranged, respectively.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the gravure coating approach and gravure coater which can poor-apply a coating agent by homogeneity thickness also to the gravure coating approach and gravure coater charge, and a thin base material especially.

[0002]

[Description of the Prior Art] In JP,2-7663,Y and JP,5-53553,B, these people could give the poor coating with uniform coating thickness only with a gravure roll, without could give always good coating, without a longitudinal wrinkle occurring also to the thin base material in which 2 micrometers - about 9 micrometers of thickness whose good coating was made impossible till then are, and using smoother, and a configuration is also easy people and they have proposed the micro gravure coating system also with cheap cost.

[0003] Furthermore, it is requested that the poor coating with uniform coating thickness is given without are much more accurate and generating a longitudinal wrinkle etc. more certainly to a thin base material in today. Today's base material with this thin is because the class is continuing variably and the base material of what has a weak lifting and the so-called small weak waist of cone rigidity itself is moreover increasing in number deformation of a longitudinal wrinkle etc. This inclination is strong to the base material for thin layer coating performed in order to form the material for electronic parts, such as a capacitor, especially.

[0004] This invention is made in view of these points, and it aims at offering the gravure coating approach and gravure coater which can poor-apply a coating agent with a very sufficient precision by homogeneity thickness certainly to all kinds of thin base material.

[0005]

[Means for Solving the Problem] In order to attain said purpose the gravure coating approach of this invention according to claim 1 the continuum it is running in the shaft orientations and the rectangular direction of both the attitude control roll where a top face is supported with the attitude control roll in which parallel free rotation of the pair whose diameter is about 20mm - about 50mm is free -- caudad during said both attitude control roll of the base material of a **. While rotating the gravure roll whose diameter by which it has been arranged at both the attitude control roll and parallel, and the gravure pattern was formed in the perimeter of a peripheral face is about 20mm - about 50mm with the peripheral velocity which has said base material and relative velocity. From the front face of this gravure roll, with a doctor blade, a surplus coating agent is wiped off, before giving coating, coating of the coating agent of a quantum is carried out to the inferior surface of tongue of that base material in the location which has the top face of said base material in a free condition, and it is characterized by poor-applying a coating agent to said base material.

[0006] Moreover, the gravure coater of this invention according to claim 3 the continuum it is running -- the diameter which supports the top face of the base material of a ** with the attitude control roll in which parallel free rotation of the pair which is about 20mm - about 50mm is free. The top face of the base material of a ** is the gravure roll which carries out coating of the coating agent to the inferior surface of tongue of the base material in the location in a free condition. the continuum it is running between both attitude control rolls -- The gravure roll whose diameter by which it has been arranged at both the attitude control roll and parallel, and the gravure pattern was formed in the perimeter of a peripheral face is about 20mm - about 50mm, It is characterized by having the doctor blade which a surplus coating agent is wiped [doctor blade] off from the front face of this gravure roll before giving coating, and makes the coating agent of a quantum supply to the

coating section.

[0007] Moreover, in claim 1 or claim 3, it is characterized by for each attitude control roll approaching a gravure roll, respectively, and arranging it.

[0008] In this invention, a gravure coater according to claim 3 is used. By the approach according to claim 1 the continuum it is running where a top face is supported with the attitude control roll of an parallel pair, if the top face of the base material of a ** carries out coating of the coating agent to the inferior surface of tongue of the base material in the location in a free condition It is run by holding in the shape of flatness and being spread, without a base material generating deformation of a longitudinal wrinkle etc. between both the attitude control roll and a gravure roll, and a coating agent is certainly poor-applied to homogeneity thickness with a very sufficient precision.

[0009] Furthermore, if a gravure roll is approached, respectively and both the attitude control roll is arranged, the surface smoothness of the base material between both the attitude control roll and a gravure roll can be held more certainly, and a coating agent can be certainly poor-applied to homogeneity thickness with a very sufficient precision.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained about drawing 10 from drawing 1.

[0011] Drawing 3 shows an example of the gravure coater which applies this invention approach from drawing 1, and drawing 4 and drawing 5 show one example of the gravure roll used for this.

[0012] first, drawing 1 and drawing 2 -- setting -- a continuum -- it is made to run the base material 10 of a ** from the left of drawing 1 horizontally to the right As it lets out from an original fabric roll (not shown) and is shown in drawing 1 the middle, this base material 10 is spread with the spreading roll 11, the attitude control rolls 12 and 12 of a pair, and the spreading roll 11, is rolled round at the end, and is rolled round with a roll (not shown). A diameter is set to about 20mm - about 50mm, and the attitude control rolls 12 and 12 of a pair are supported free [free rotation]. And while setting a diameter to about 20mm - about 50mm under the base material 10 of the interstitial segment of the attitude control rolls 12 and 12 of a pair, the transit direction of a base material 10 and shaft orientations are made to cross at right angles, and the gravure roll 13 which was made into the same diameter as the attitude control roll 12, and made the peripheral face ceramic material makes, and is constructed across horizontally. This gravure roll 13 is supported free [rotation] with bearing 16 and 16 by one pair of supporter material 15 and 15 set up on the pedestal 14 moved up and down by the well-known proper rise-and-fall drive (not shown). Turning effort is transmitted to this gravure roll 13 through coupling (not shown [both]) from a drive motor. In this operation gestalt, the gravure roll 13 is rotated by hard flow (counterclockwise rotation of drawing 1) in the transit direction and the contact section of a base material 10. moreover, the gravure pattern 17 of width of face narrower than full [of a base material 10] covers the perimeter, resembles the peripheral face which consists of ceramic material of the gravure roll 13, and is engraved on it. On the pedestal 14 of the lower part of this gravure roll 13, the overflow receptor 18 is being fixed with the binding bolt 19. And on this overflow receptor 18, the coating agent supply nozzle 20 which supplies a coating agent to the gravure roll 13 has fixed. This coating agent supply nozzle 20 is formed in the same width of face as the gravure pattern 17 of the gravure roll 13 as shown in drawing 2. Moreover, as shown in drawing 1, the coating agent supply nozzle 20 infixes thin filling material 21 in the bottom half section, it carries out binding fixing and the nozzle piece 20a and 20b of 2 cracks is mutually formed in one. And the coating agent reservoir section 22 of a long cross-section round shape is formed crosswise which once stores the coating agent fed into the upper part of the thin filling material 21 from the outside. And the long and slender free passage slot 23 formed by not making thin filling material 21 placed between the upper parts of this coating agent reservoir section 22 is formed. And the long and slender nozzle section 24 opened to the upper part which stores the coating agent fed through the free passage slot 23 from the coating agent reservoir section 22, and is made to apply to the gravure pattern 17 of the gravure roll 13 is formed in the upper limit section of the coating agent supply nozzle 20. The die length of this nozzle section 24 is formed identically to the width of face of the gravure pattern 17 of the gravure roll 13, and the lock out members 28 and 28 for width-of-face regulation which blockade the both ends of the nozzle section 24, respectively have fixed in the crosswise both ends of the coating agent supply nozzle 20. Moreover, the doctor blade 25 which wipes off the surplus coating agent applied to the gravure pattern 17 just before the gravure pattern 17 of the gravure roll 13 carries out coating of

the coating agent stored in the nozzle section 24 to the inferior surface of tongue of a base material 10 is formed. This doctor blade 25 is attached in the holder 27 bearing of the rotation of was made free to the pivot 26 parallel to the gravure roll 13. And this doctor blade 25 functions as wiping off the coating agent of a lateral part from the both ends of that gravure pattern 17 while it covers full and makes it filled up with a proper quantity of a coating agent in the gravure pattern 17 of the gravure roll 13.

[0013] As shown in drawing 3, the up unit 30 whose rocking has a pivot 29 and is enabled is equipped with said spreading rolls 11 and 11 and the attitude control rolls 12 and 12 respectively free [rotation]. The up unit 30 is equipped especially with the attitude control rolls 12 and 12 of a pair with the well-known justification means 31 which combined a radial bearing, thrust bearing, etc. in the both ends for adjustment of parallelism with the gravure roll 13. Furthermore, the rotation touches the attitude control rolls 12 and 12 of a pair, they set precision to less than 0.005-0.008mm, and bearing is carried out while being supported pivotably so that it can rotate very lightly if each contacts a base material 10 and a base material 10 runs. And he moves the up unit 30 and is trying to make the attitude control roll 12 of a pair, and the base material 10 spread among 12 attach and detach on the top face of the gravure roll 13. Furthermore, it is made the magnitude of diameter extent of each rolls 12 and 13, and it approaches, the wheel base of both the attitude control rolls 12 and 12 and the gravure roll 13 is arranged, and it enables it to hold more certainly the surface smoothness of the base material between both the attitude control rolls 12 and 12 and the gravure roll 13.

[0014] Drawing 4 shows the detail of the gravure roll 13. the gestalt of this operation -- setting -- the gravure roll 13 -- a degree -- ** -- it is made like and manufactured. First, the plasma metal spray of the ceramic material powder is carried out to the peripheral face of metal roll heart 13a, such as steel which has rigidity and toughness, and ceramic material layer 13b of predetermined thickness is formed. Next, cylinder polish of the peripheral face of ceramic material layer 13b is carried out, and it sculpts into the gravure pattern 17 by laser engraving after that. It is referred to as much parallel inclination slot 17a as this gravure pattern 17. Each inclination slot 17a is formed by overlapping a part in the inclination direction and carrying out continuation sculpture of the small-circle hole carved by laser engraving, respectively. Furthermore, as shown in drawing 5, the predetermined length L of the shaft-orientations both ends of each inclination slot 17a is formed so that a channel depth may become shallow gradually towards an edge. Thus, after being sculptured into each inclination slot 17a, it is good to perform vertical polish if needed.

[0015] Next, poor coating of the coating agent by this invention approach is explained to the gravure coater list shown in drawing 3 according to a process using the gravure roll 13 shown in drawing 4 and drawing 5 from drawing 1.

[0016] Move the up unit 30 to the chain-line location of drawing 1, and it is made to orientate, and is made to run a base material 10 rightward from the left of drawing 1 at a predetermined rate after that. While feeding a coating agent at coincidence through the coating agent reservoir section 22 and the free passage slot 23 into the nozzle section 24 of the coating agent supply nozzle 20, this drawing counterclockwise rotation is made to rotate the gravure roll 13. It is immersed in the lower part of the gravure pattern 17 of the gravure roll 13 into the coating agent in the nozzle section 24 by this, and restoration supply of the coating agent is carried out into the gravure pattern 17, and according to rotation of the gravure pattern 17, it goes on in the doctor blade 25 direction, and goes to it. The amount of feeding of the coating agent into the nozzle section 24 at this time is good to consider as the amount of supply, the tales doses, or many [a little] amounts of a coating agent to the gravure pattern 17. And the coating agent applied to the gravure pattern 17 is wiped off in a doctor blade 25, and restoration supply only of the proper amount is carried out only full [of the gravure pattern 17]. The surplus coating agent wiped off by this doctor blade 25 is again supplied to the gravure pattern 17, or after flowing down the front face of the coating agent supply nozzle 20 and being stored in the overflow receptor 18, it is again returned in the coating agent reservoir section 22. Thus, if a proper quantity of a coating agent comes to be supplied in the gravure pattern 17 of the gravure roll 13, the gravure roll 13 will be raised together with a pedestal 14 towards the inferior surface of tongue of the base material 10 it is running by making it move to the chain-line location of drawing 1, and being made to orientate. Or the up unit 30 is moved to the chain-line location of drawing 1, the gravure pattern 17 of the gravure roll 13 is contacted on the inferior surface of tongue of a base material 10, and coating of the coating agent in the gravure pattern 17 is carried out to the inferior surface of tongue of a base material 10.

[0017] The gravure roll 13 will be contacted on the inferior surface of tongue of the base material 10 of the

location which has the top face of the base material 10 of a ** in a free condition, and coating of the coating agent will be carried out. in this case, the continuum it is running where a top face is supported with both the attitude control rolls 12 and 12 -- It is run by holding in the shape of flatness and being spread, without a base material 10 generating deformation of a longitudinal wrinkle etc. mutually between both the parallel attitude control rolls 12 and 12 and the gravure roll 13. Since both the attitude control rolls 12 and 12 and the gravure roll 13 approach and are especially arranged in this operation gestalt, the surface smoothness of the base material 10 between both the attitude control rolls 12 and 12 and the gravure roll 13 can be held more certainly. [0018] Moreover, further, in this operation gestalt, since the transit direction of a base material 10 and the hand of cut of the gravure pattern 17 are hard flow in the mutual contact section, the gravure pattern 17 will have produced slipping to the inferior surface of tongue of a base material 10. It changes coating into the poor coating condition that the pattern of the gravure pattern 17 by which coating was carried out by this to the inferior surface of tongue of a base material 10 will slide on the transit direction and hard flow of a base material 10, and smooth [of the coating agent] was carried out to homogeneity on the inferior surface of tongue of a base material 10. In this case, coating thickness is adjusted by changing the relative-velocity difference of a base material 10 and the gravure roll 13. Thereby, according to this invention approach, smoothing equipment can be excluded. Moreover, since the rubber roller for pressurization etc. is not prepared in the opposite side of the gravure roll 13 about a base material 10, coating of the coating agent can be carried out very good, without a longitudinal wrinkle occurring, even when a base material 10 is thin. Moreover, since the gravure roll 13 and both the attitude control rolls 12 and 12 are thin, while a touch area with the inferior surface of tongue of a base material 10 becomes very small compared with the conventional gravure roll with a large diameter and can carry out coating of the coating agent to homogeneity very good to a base material 10, the contact to a base material 10 and detached building **** become good, and can perform the location of initiation of spreading, and a halt correctly. Furthermore, it becomes cheap [the cost of the gravure roll 13], and the whole machine also becomes small, and the driving force of vertical movement is also small and ends. [0019] Furthermore, in the gestalt of this operation, since it is the product made from the ceramics which the peripheral face of the gravure roll 13 becomes from ceramic material layer 13b, the gravure pattern 17 can be freely engraved on the roll surface made from the ceramics by the laser spraying process, and the very accurate gravure roll 13 can be manufactured. Therefore, the mother meal of ** with which the gravure roll 13 made from the ceramics of the gestalt of this operation is excellent in endurance with the meal as compared with the metal gravure roll, and becomes unnecessary [the expensive mother meal for rolling], and the gravure patterns which should be manufactured differ also becomes unnecessary, and since it is not what moreover pushes a mother meal on the cylinder roll for a gravure roll strongly at the time of rolling, the result precision of the gravure roll 13 is highly maintainable easily. Furthermore, by setting the gravure pattern 17 to much parallel inclination slot 17a, coating of the coating agent can be carried out more to homogeneity, and poor coating of very uniform thickness can be given. Furthermore, it can prevent certainly becoming thicker than the part of others [thickness / coating / in / by forming so that a channel depth may become shallow gradually towards an edge in the both ends of the gravure pattern 17 which consists of inclination slot 17a / the both ends concerned], and coating of the coating agent can be carried out more to homogeneity. [0020] Furthermore, the point of having formed minor diameter gravure roll 13 and doctor blade 25 in the gestalt of this operation first about the good coating operation by the gestalt of this operation based on drawing 10 from drawing 6 is explained.

[0021] While using the minor diameter gravure roll 13 in the gestalt of this operation, the coating agent in the gravure pattern 17 correctly measured by the doctor blade 25 is supplied to the coating section to a base material 10, as the travel speed of a base material 10 and the peripheral velocity of the gravure roll 13 are changed in the coating section, it is made to perform coating, and thereby, according to the gestalt of this operation, coating of the good coating agent which could not be attained is performed by the former.

[0022] Namely, if the minor diameter gestalt [of this operation] gravure roll 13 and major diameter former gravure roll 13a are contacted to a base material 10 from an inferior surface of tongue with the same contact angle α as shown in drawing 6 Naturally as for the contact hoop direction die length of the gravure rolls 13 and 13a to a base material 10, as a result, the direction of the gravure roll 13 of the gestalt of this operation of the touch area of a base material 10 and the gravure rolls 13 and 13a becomes [the direction of the gravure roll 13 of the gestalt of this operation] small in short ****. By supplying the coating agent correctly measured with

the doctor blade 25 to the coating section, in the conventional example, the gestalt of this operation is the following, and can make and give very good coating which could not be attained to the difference list of the size of this contact hoop direction die length and a touch area.

[0023] First, although the coating agent which was stored in the gravure pattern 17 formed in the peripheral face of a gravure roll, and was transported to the contact section with a base material 10 is imprinted by touching a base material 10 at a base material 10 side When the contact section of the gravure rolls 13 and 13a and base material 10 is observed microscopically and a travel-speed difference is between the gravure rolls 13 and 13a and a base material 10 It is formed in the range of the include angle which is from the small space 35 and 35a of the wedge cross section between the base material 10 and the gravure rolls 13 and 13a which have spread a little on the transit direction order side of a base material 10 from this contact angle. a coating agent layer thin between the gravure rolls 13 and 13a and a base material 10 -- said contact angle + -- Coating of the coating agent is carried out to a base material 10 from this coating agent layer part.

[0024] However, if a base material 10 and hard flow are made to rotate gravure roll 13a like the gestalt of this operation for example, as shown in drawing 7 (a) when the diameter of gravure roll 13a is large, the frictional force produced between gravure roll 13a and a base material 10 will become very large. In order to make it run a base material 10 smoothly under existence of this big frictional force, a base material 10 must be given and run the bigger spreading force than said frictional force. If the big spreading force acts on a base material 10, a base material 10 will be pushed in the direction of a core of gravure roll 13a of the spreading force by the other component of a force towards the peripheral face of gravure roll 13a. The coating agent layer (in this drawing, the slash shows the coating agent (in drawing 8 and drawing 9 , it is the same)) formed among both will be eliminated, the peripheral face of gravure roll 13a will be directly contacted in the central part of said contact angle alpha, and the frictional force between both will be increased further. The spreading force F which should be given to a base material 10 in connection with this must be increased further. If such big spreading force F acts on the thin base material 10, two or more longitudinal wrinkles 32 and 32 -- which are prolonged in the base material 10 at the spreading direction, i.e., a longitudinal direction, as shown in drawing 8 (a) will occur. Spacing of a base material 10 and gravure roll 13a became uneven to the cross direction of a base material 10, it became uneven [the coating dose in the cross direction of the base material 10 of the coating agent layer between a base material 10 and gravure roll 13a], the coverage of the coating agent to a base material 10 also became an ununiformity after all, and coating unevenness occurred. Two or more pinstripes 33 and 33 -- which consist of a part with many amounts of coating and few parts along with the longitudinal wrinkle 32 of a base material 10 as a gestalt of this coating unevenness occur. Moreover, in the conventional example, since the frictional force between gravure roll 13a and a base material 10 is large, it is difficult to make it run a base material 10 at uniform velocity, the travel speed of a base material 10 serves as non-uniform transit to which ** which became early or became late is repeated, and loop food **** disk 34-like coating unevenness generates [a part with many amounts of coating and few parts] it in the longitudinal direction of a base material 10. Furthermore, in the conventional example, since the diameter of gravure roll 13a is large, when separating from the coating agent layer currently stored by small space 25a of the wedge cross section where the transit direction front side of a base material 10 is formed between a base material 10 and gravure roll 13a, the longitudinal wrinkle might arise in the base material 10. Because, if the dilation ratio of spacing of a base material 10 and gravure roll 13a is small and puts in another way towards the transit direction of a base material 10 in said small space 35a part from wedge-shaped top-most vertices While a wedge becomes very sharp and the hoop direction die length to gravure roll 13a of the coating agent layer stored in this smallness space 35a becomes long The exfoliation force of acting between base material 10 parts which are going to separate from the edge of the coating agent layer became large, two or more longitudinal wrinkles occurred in the base material 10, and coating unevenness had arisen. In the conventional example, these fault parts acted each other complexly, and were not able to carry out coating of the coating agent to homogeneity. Since it was such, coating thickness was not able to be adjusted, either.

[0025] Moreover, since it was not what measures correctly the coating dose conveyed to the coating section with a roll to the specified quantity even if it conquers the trouble of a major diameter roll of having applied the coating agent to the base material and having mentioned it above only using the minor diameter roll like before, only at the coating process with the roll, it is impossible to make coating thickness into homogeneity, and smoother had to be prepared after all.

[0026] Since according to the gestalt of this operation the diameter of the gravure roll 13 was made small as shown in drawing 6, even if the touch area of the gravure roll 13 and a base material 10 becomes small as mentioned above, and it, on the other hand, makes a base material 10 and hard flow rotate the gravure roll 13, the frictional force produced between the gravure roll 13 and a base material 10 is suppressed very small.

[0027] Therefore, the spreading force f given to the base material 10 required in order to make it run a base material 10 smoothly as shown in drawing 7 (b) is suppressed small. Of this spreading force f being small, the other component of a force is also small suppressed in the direction of a core of the gravure roll 13 of that spreading force f , it is lost that the inferior surface of tongue of a base material 10 contacts the peripheral face of the direct gravure roll 13, and a thin coating agent layer is certainly formed between a base material 10 and the gravure roll 13. By forming this thin coating agent layer, the frictional force between a base material 10 and the gravure roll 13 is suppressed still smaller, and the spreading force f given to a base material 10 is suppressed small.

[0028] Therefore, according to the gestalt of this operation, even if base materials 10 are several micrometer[in thickness] m , and a very thin case, a longitudinal wrinkle 32 like before does not arise.

[0029] And the drag force to transit of a base material 10 can be very small, and can make it run a base material 10 with constant speed that the frictional force between a base material 10 and the gravure roll 13 is small, and by forming the thin coating agent layer among both.

[0030] Furthermore, the sharpness of the wedge of the small space 35 formed between a base material 10 and the gravure roll 13 Since the diameter of the gravure roll 13 is small, while it becomes sharp compared with the conventional example and the hoop direction die length of the gravure roll 13 of the coating agent layer stored by the small space 35 also becomes short The exfoliation force of acting between the parts of the base material 10 which is going to separate from the edge of a coating agent layer is also suppressed small, and a longitudinal wrinkle does not generate it in a base material 10.

[0031] Furthermore, in the gestalt of this operation, when a base material 10 runs with constant speed The coating agent of a constant rate will be imprinted by the base material 10 from the coating agent layer of the small space 35. And by supplying the coating agent of a coating dose and takes doses imprinted through each gravure pattern 17 of the gravure roll 13 under constant peripheral-speed rotation measured correctly with a doctor blade 25 When the ratio of the travel speed of a base material 10 and the peripheral speed of the gravure roll 13 becomes a predetermined value, the amount of imprints and the amount of supply of a coating agent become the same, it balances, and coating with the fixed coating thickness of the coating agent to a base material 10 is given. Drawing 10 shows the relation of the coating thickness and said both velocity ratios. The balance of the imprint of a coating agent and supply in this small space 35 is obtained when each movement force given by rotation of the gravure roll 13 and transit of a base material 10 to a coating agent balances with the property of a coating agent, i.e., surface tension, and viscosity.

[0032] Next, the operation by having formed both the attitude control rolls 12 and 12 is explained.

[0033] the continuum it is running in the gestalt of this operation where a top face is supported with both the attitude control rolls 12 and 12, since the top face of the base material 10 of a ** contacts the gravure roll 13 on the inferior surface of tongue of the base material 10 of the location in a free condition and is made to carry out coating of the coating agent It is run by holding in the shape of flatness and being spread, without a base material 10 generating deformation of a longitudinal wrinkle etc. mutually between both the parallel attitude control rolls 12 and 12 and the gravure roll 13. Since both the attitude control rolls 12 and 12 and the gravure roll 13 approach and are especially arranged in the gestalt of this operation, the surface smoothness of the base material 10 between both the attitude control rolls 12 and 12 and the gravure roll 13 can be held more certainly.

[0034] And the coating agent layer formed between the base material 10 it is running with [in the gestalt of this operation, act each other in / these operations / ****, and] surface smoothness, and the gravure roll 13 is always held in the fixed condition, and it is poor-applied to homogeneity thickness certainly with a precision very sufficient [a coating agent] to a base material 10.

[0035] Moreover, in the gestalt of this operation, coating of the letter of poor coating with the uniform coating thickness which graduated the sculpture pattern of the gravure roll 13 can be given, without imprinting a coating agent to a base material 10 from the coating agent layer currently stored in the small space 35 of a wedge cross section, and using smoothing devices, such as a smoothing knife and a smoothing roller.

[0036] Furthermore, since the coating agent layer formed between a base material 10 and the gravure roll 13 as

shown in drawing 9 is correctly formed in parallel with the shaft orientations of the gravure roll 13, it can form the edge of the spreading part of the coating agent in the coating starting position and coating termination location to a base material 10 so that it may intersect perpendicularly with the transit direction of a base material 10 correctly, and can also make a coating result very good.

[0037] And the coating thickness of the coating agent to a base material 10 can be adjusted by changing the relative velocity of the peripheral velocity of the gravure roll 13 to the travel speed of a base material 10, as shown in drawing 10.

[0038] In addition, by rotating the gravure roll 13 clockwise in this drawing, and preparing a relative-velocity difference in a base material 10 and the gravure roll 13 further, although the base material 10 and the opposite direction were made to rotate the gravure roll 13 in drawing 1, while forming a doctor blade 25 in the opposite side to the gravure roll 13, you may form so that coating by which the coating agent was graduated on the inferior surface of tongue of a base material 10 may be given. In this case, if peripheral velocity of the gravure roll 13 is made larger than the travel speed of a base material 10 and it will be made especially an about 2-time rate, smoothing of a coating agent will be performed very good.

[0039] And if a base material 10 and hard flow are made to rotate the gravure roll 13, and the gravure roll 13 is rotated in a base material 10 and this direction when the viscosity is low when the viscosity of a coating agent is high, a coating agent can be graduated good. Moreover, by changing the rotational speed of the gravure roll 13 and adjusting the relative velocity of a base material 10 and the gravure roll 13, as shown in the property Fig. of drawing 10, it can combine with adjustment of said smoothing and the coating thickness of the coating agent to a base material 10 can be adjusted.

[0040] In addition, this invention is not limited to the gestalt of said operation, and can be changed if needed. For example, it divides into the shaft orientations of a roll at plurality, and prepares intermittently, and it may consider as SUTORAIBU sculpture or you may make it form the gravure pattern in the gestalt of said operation also in the hoop direction of a roll partially. Moreover, although the gravure pattern in the gestalt of said operation was used as the inclination slot, it is good also considering this as a pattern of the shape of a grid, or trapezoidal shape. Moreover, the thing made from metal material may be used as a gravure roll.

[0041]

[Effect of the Invention] Since the gravure coating approach and gravure coater of this invention are constituted in this way and act, they can poor-apply a coating agent with a very sufficient precision by homogeneity thickness certainly to all kinds of thin base material.

[0042] In this invention, furthermore, by giving coating by the approach according to claim 1 using a gravure coater according to claim 3 Coating of the coating agent can be carried out to the inferior surface of tongue of the base material in the location which has the top face of the base material of a ** in a free condition. the continuum it is running where a top face is supported with the attitude control roll of an parallel pair -- It is run by holding in the shape of flatness and being spread, without a base material generating deformation of a longitudinal wrinkle etc. between both the attitude control roll and a gravure roll by this, and a coating agent is certainly poor-applied to homogeneity thickness with a very sufficient precision.

[0043] Furthermore, by approaching a gravure roll, respectively and arranging both the attitude control roll, the surface smoothness of the base material between both the attitude control roll and a gravure roll can be held more certainly, and a coating agent can be certainly poor-applied to homogeneity thickness with a very sufficient precision.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing of longitudinal section showing an example of the gravure coater for enforcing the gravure coating approach of this invention

[Drawing 2] The contraction sectional view which met the II-II line of drawing 1

[Drawing 3] Drawing of longitudinal section showing an up unit

[Drawing 4] The expansion half section Fig. of the IV section of drawing 1

[Drawing 5] The sectional view which met the V-V line of drawing 4

[Drawing 6] The schematic diagram which compares the configuration of the important section of this invention approach and the conventional example

[Drawing 7] (a) and (b) are the explanatory view showing the coating agent layer formed between the base materials and gravure rolls in the conventional example and this invention, respectively.

[Drawing 8] (a) and (b) are the outline perspective view showing the coating condition in the conventional example, respectively.

[Drawing 9] The same drawing as drawing 7 of this invention

[Drawing 10] The property Fig. showing relation with the coating thickness of the coating agent to the relative velocity and the base material which consist of a travel speed of the peripheral velocity/base material of a gravure roll

[Description of Notations]

10 Base Material

12 Attitude Control Roll

13 Gravure Roll

17 Gravure Pattern

25 Doctor Blade

[Translation done.]

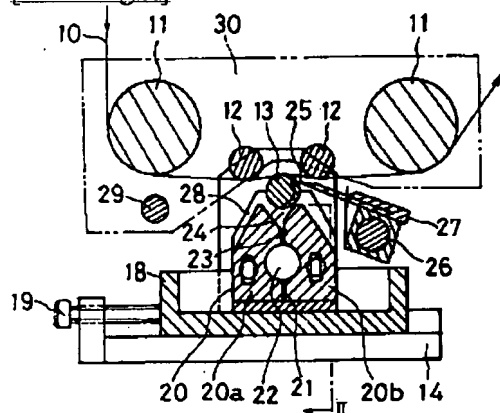
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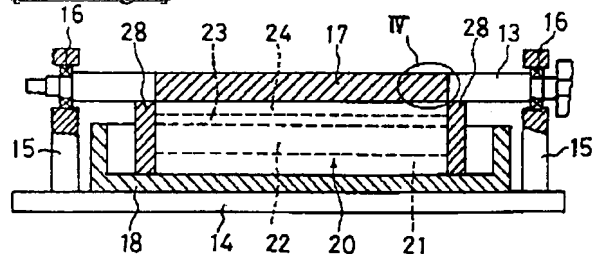
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DRAWINGS

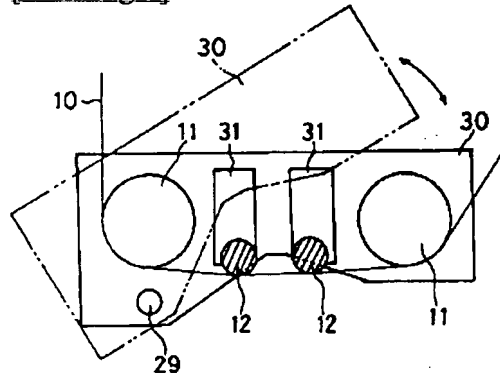
[Drawing 1]



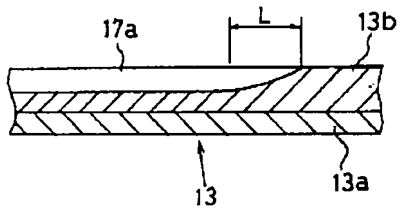
[Drawing 2]



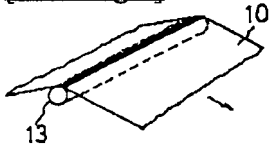
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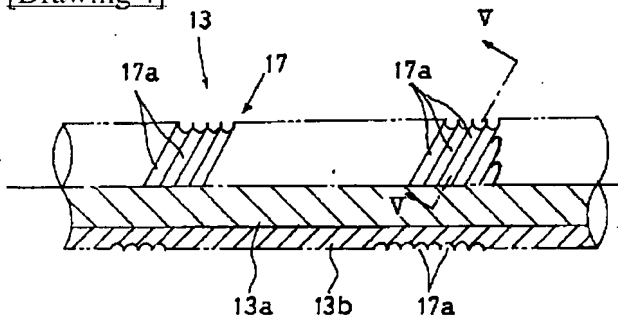
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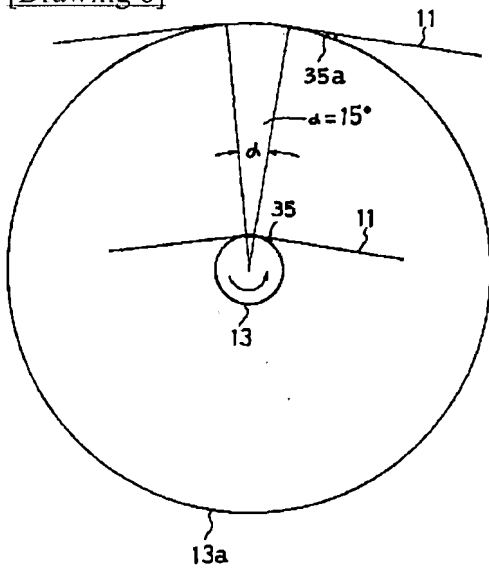
[Drawing 9]



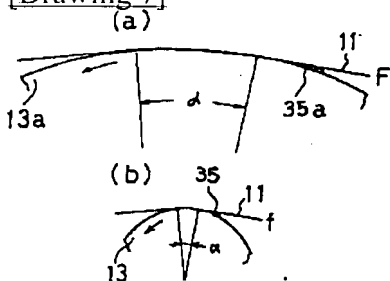
[Drawing 4]



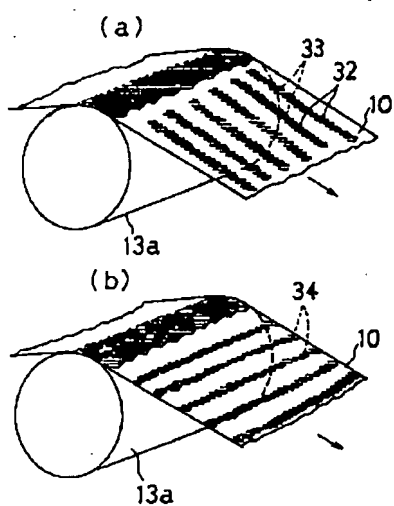
[Drawing 6]



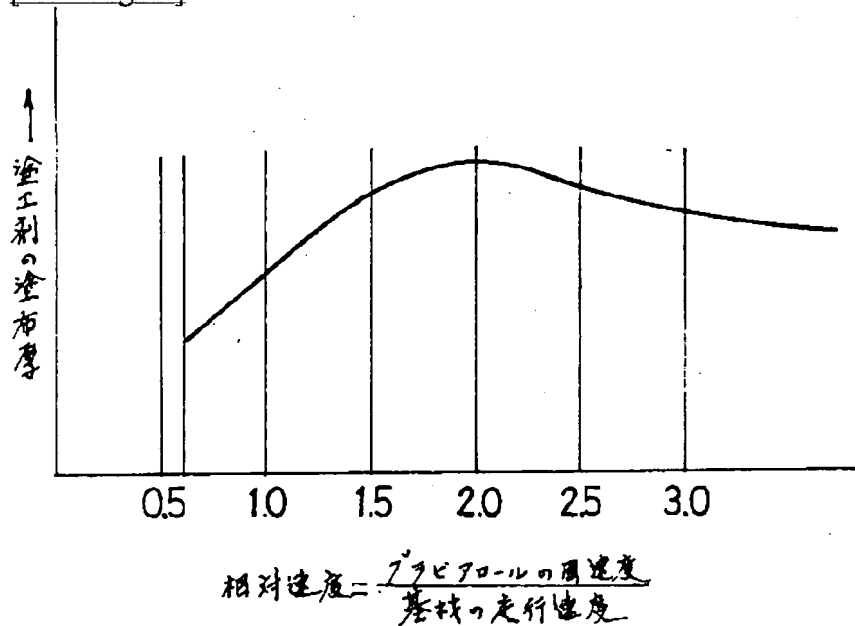
[Drawing 7]



[Drawing 8]



[Drawing 10]



[Translation done.]